ISSN 1751-0716

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EDITORIAL

Reclaiming Science

A recent focus in Nature Magazine shed light on the weak situation of science and education in Muslim countries which makes up nearly one quarter of today's world population[1]. Astonishing is the fact that half of the 28 lowest producers of scientific articles, as recorded by the US National Science Foundation, are members of the 57-nation Organisation of the Islamic Conference (OIC). Notably, in 2003 the world's average for production of articles per million inhabitants was 137, whereas none of the 47 OIC countries for which there were data achieved production more than 107 per million inhabitants. The OIC average was just 13. A main reason for this lagging-behind is low investment in R&D. In 20 OIC countries, R&D spending was 0.43% of their GDP between 1996 and 2003 compared to the global average of 2.36% over the same period. However, a more fundamental problem, also common to many other developing countries, is the lack of organisation and absence of human interest and initiative.

Nevertheless it is encouraging that countries such as Malaysia and Turkey are showing real sings of progress. Malaysia is currently ranked fifth amongst world's technology exporters with 58% while Turkish science funding has more than trebled since 2003. Recently, many developing nations are also undertaking major economical reforms and long-term development programs; and our community of academics, students and professionals can play a pivotal role in this. One venue would be to initiate intellectual debates on the issues surrounding plans for modernising education, health and economics. For instance, this new issue of the IBScientific Magazine contains an open invitation by Djihed Afifi to discuss IT strategies in Algeria[2]. In a world of fierce battle between IT Corporate and

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IBScientific Magazine is open to all contributions from all disciplines. The editorial team is not responsible for the opinions expressed in IBScientific Magazine.

Subscription to IBScientific Magazine is free. For more details, email editorial@ibscientific.net.

IBScientific Magazine is a registered publication: ISSN 1751-0716.

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Open Source products, Mr Afifi describes the current challenges facing IT infrastructure and software usage and development in the North African country. Along this direction, the broader goals of IBS Magazine is to provide an open communal space for a vivid academic dialogue which can lead to real solutions, potentially attracting interest for practical use by policy makers.

Such forums may well yield ideas that can make real advancement. For example, the IBS team is putting together a network which will include Algerian academics and professionals from around the world with the aim of establishing the Algerian Academy of Science (AAS). This is an attempt to follow the successful example of The Arab Science and Technology Foundation (ASTF), based in Sharjah in the United Arab Emirates[3]. Such a body would function much like an independent national science-promoting and funding agency, prospectively offering grants to scientists based on an open, competitive process and peer review. On another side, IBS is also taking part in organising a conference in Algiers on 16 April 2006 which will be an opportunity to add our voice to the scientific community in Algeria.

I realise that projects such as a National Academy are big and ambitious. However, I believe that it can be made real, and a true intellectual revolution is what is required. A revolution which does not need a miracle but a commitment, no matter how small, from everyone to make up time and effort to help build the future for the millions of children in societies that made us the persons we are today.

Younes MOKRAB
IBScientific Managing Reviewer

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[1] Nature 444:1027, 2006.
[2] IBScientific 2:100, 2006.
[3] Nature 416:120–122, 2002.

News

Press

IBScientific in the press

AFTER the overwhelming success of the first IBScientific Annual Conference (IBSAC 2006), IBS has made it to the national press in Algeria.

On 9th July, the Algerian Press Agency APS published the news on their website [1]. The information also appeared on the most popular daily El Khabar in its issue on the same day [2].

APS commented on the successful event and highlighted the support and admiration of His Excellency, Mr Mohamed Salah Dembri, Ambassador of Algeria to the UK, who considers IBScientific as an important player in establishing links and collaboration between participants from the two countries.

El Khabar saluted the aim of IBScientific of promoting publication, research and collaboration amongst researchers in the developing world in general, and particularly, the estimated 2000 Algerians in academia in the United Kingdom.

S.N. Source: El Khabar Daily, 09/07/2006.

Immunology

Algeria enhances its immunology research

FOR a long time, Algeria's research has overtly been suffering because of insufficient funding and brain drain. And so was the case for immunology field. But both scientists and patients can now breathe a sigh of relief: on 22 July 2006, researchers convened a meeting here in Algiers under the auspices of Minister of Health, Amar Tou, and Delegate Minister for Higher Studies and Scientific Research, Souad Bendjaballah, to come up with a government boost of $1-billion programme to be funnelled over five years (2006-2010).This consequent budget is poised to usher in a new Algerian policy at academic immunology research and clinical levels alike. This praised initiative, dubbed National Network for Immunology Research (NNIR), set to meet three main goals: (1) federation of efforts, (2) mutualisation of funds, and (3) sharing of knowledge, experiences and research results.

Immunology was not given before an important stand in research and hospital agendas. This subject was just allotted 6 hours a year in universities' syllabi. However, since 2000 immunology gained momentum and is now taught 60 hours per annum, in other words a tenfold increase. Moreover, hospital specialists in immunology were since 1980 is few as 60.And the Algerian Society for Immunology saw the day just in 2005.

To fill in all these gaps, the two government representatives declared to the state-run television that "this NNIR will focus on doctorate-level training and research in immunology."

Finally, Pasteur Institute of Algeria and overseas-based Algerian immunologists will play a pivotal role in steering research projects. That shall beef up our defences!

B.M. Source: El Moudjahid Daily, 23/07/2006; and the Algerian Television (ENTV).

Pharmaceuticals

Algeria's Saidal churns out the bird flu drug, Saiflu

IN the wake of avian influenza outbreaks, brought about by H5N1 virus, that have been striking mainly in Southeast Asia, Europe, and Africa, preventive measures are needed to fend off a deadly pandemics.And because Algeria would not be at bay, Saidal Group Pharmaceuticals, headquartered in Algiers, announced last April the official launch of the production of the anti-bird flu drug Tamiflu (chemically named Oseltamivir). The drug will be manufactured under the trade name Saiflu.Algeria's pharmaceutical giant signed a contract with India's Hetero Drug company, which holds since December 2005 the licence from the developer of Tamiflu, Hoffmann-La Roche of Switzerland.

In the issued communiqué, it turns out that Saiflu will be produced as boxes of 10 capsules with oseltamivir dosage of 75 mg in each capsule.Besides, the Algerian company added that it will churn out 50,000 boxes a day in a laboratory (named Biotheque) located at Gue de Constantine (East of Algiers).This capacity will cover 50 % of the likely population that would come down with avian flu.This coverage is much higher than that fixed by World Health Organization (WHO). Saiflu will cost 1352 Algerian Dinars ($ 14).

Finally, Saidal's Director, Ali Aoun, pointed out that this drug "will be marketed even though there would be no avian pandemics, for Saiflu is effective against common flu as well."

B.M. Source: El Moudjahid Daily, 11/04/2006.

Space Sciences

UK signs space co-operation agreement with Algeria

ALGERIAN Space Agency

1. **Algerie Press Service. http://www.aps.dz. Visited on 08/07/2006.**
2. **El Khabar, 09/07/2006, page 23. http://www.elkhabar.com/pdfkhabar/quotidien/2006/07/08/quotidien.pdf**
3. **http://www.bnsc.co.uk**
4. **http://www.gisdevelopment.net, accessed 20/07/2006**
5. **Science 314:278.**

(ASA) and British National Space Center (BNSC) [3] signed in a Memorandom of Understanding late of July 2006 that will enable Great Britain to technically support Algeria in the realization of a satellite for telecommunications and the establishment of a satellite-developing unit in Algeria. The agreement memo was enacted in the fringe of BNSC's Farnborough International Airshow that was held in London from 17 to 23 of July, 2006. ASA's Director, Dr Azzedine Oussedik, and UK Minister for Science and Innovation, Lord Sainsbury, signed this Memorandon of Understanding. The cooperation in space sciences between the two countries was the outcome of Algerian President Abdelaziz Bouteflika's 2-day (11-12 July,2006) recent visit to Great Britain where he met with British Prime Minister Tony Blair. This partnership will facilitate exchange of information and transfer of space technology to work out a myriad of projects in the field.

Previously, Great Britain aided ASA to make its first small satellite, "Alsat 1" (90 kg), which is being dedicated to mapping, monotoring and prevention of natural calamities such as earthquakes, floods, volcanoes, forest fires, and wrecking-havoc crickets. Of note, "Alsat 1" was built in British Surry county, and successfully launched in Russia's Plesetsk Cosmodrome aboard Kosmos 3M spacecraft.

Furthermore, ASA announced that two other satellites, dubbed "Alsat 2" and "Alsat 3, were being developed in Bir El Djir (Oran) [4].

B.M. Source: El Khabar Daily, 30/07/2006.

Chemistry

A new component in the "quantum control toolbox" for chemists

A new method to control the chemical reactions using a laser light acting like a catalyst has been reported by a research group in Canada [5]. This technique is non-perturbative and non-resonant to laser frequency suggesting a large number of suitable applications. Traditionally, rearranging and substituting molecules is performed with chemical reagents. Those are highly specialised chemicals that modify the outcome of a chemical reaction by altering molecular energy levels. Sadly, they can be very difficult to develop and implement.

The method developed by Albert Stolow and colleagues at Ottawa's Steacie Institute for Molecular Sciences and Queen's University in Kingston, Ontario, uses the electric field associated with a strong, precisely timed ultrafast laser pulse to modify the potential energy levels that shape a chemical reaction without any real electronic transitions. This new technique called Dynamic Stark Control (DSC) has been used by Stolow and colleagues to dissociate IBr molecules into iodine and bromine atoms. The bromine atoms are produced in two different atomic states and the researchers observed a change the relative density of the two states after the laser pulse. The molecules are almost transparent to the laser light because the intensity of the pulse was kept below the threshold to ionize the chemical constituents. As a result, DCS could revolutionise the field of catalysts because laser pulses could be easily tailored to suit any chemical reaction and allow chemists to change the molecular energy landscape structure on time scales similar to chemical processes.

According to Stolow, DSC will find a number of applications in "quantum control" for manipulating matter at the molecular level. He believes that DSC could be used to control molecular switches in quantum information systems, sharpen optical images of single cells or even to perform molecular-scale surgery on single cells.

A.B. Source: PhysicsWeb "Laser controls chemical reaction rates", 13/10/2006.

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Why Algeria should seriously think its IT strategy

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In this age of globalisation, the Information Technology (IT) sector plays an ever increasing role in the development of the third world countries. Any serious attempts at modernisation must seriously take into account the available solutions. Algeria is an example country where there is still room for an effective and thoughtful IT strategy to catch up with even other African, Arab and developing countries that have taken the initiative in this sector.

The government can play a central role in the modernisation of the IT sector, a choice of one IT solution over another, or more specifically of an Operating System over another will have a domino like effect on the rest of the country as users and businesses alike get geared towards that solution. "… because governments are the biggest single user of hardware and software in most developing countries, any decisions they make about adopting a specific operating system can have a powerful secondary compatibility effect on the OS's subsequent spread and dissemination nationwide.", as expressed by Nir Kshetri (15).

The issue is more critical as it is tremendously difficult to switch between solutions once committed, and the wrong choice may spell disaster. The cost of retraining, repurchasing licenses, abolishing old contracts and settings up new ones is simply prohibitive. Big money is at stake: the Algerian government directly employs up to 3.2 million people (4), more than 30% of the labour force (4),

with a potential for over 500,000 computers in the public and educational sectors. Using a conservative estimate of $1000 (~ 70000 DA) per computer for software and hardware costs in addition to support contracts puts the figure at $500 million, or nearly 2% of Algeria's estimated budget expenditures for 2005 (4). This is only a one off expenditure, with more money needed yearly for support and maintenance.

In this article, we try to shed the lights on some IT strategies that are suitable for implementation at the governmental level. We examine the main two IT solutions: proprietary and open source. An argument is then made for the adoption of open source software.

Proprietary solutions are by definition closed-source, meaning that only the company providing the licenses and services has access to the source code (the source code is the "recipe" that made the program or its human readable form). The most successful company of this model is Microsoft with its Microsoft Windows operating system, its suit of Office applications and the various development and server solutions such as .Net, SQL Server and Microsoft Exchange Server.

Open source solutions are embodied in numerous projects supported by various companies and distributions. The 'flagship' of open source is Linux which is the kernel or the main part of GNU/Linux distributions. It started life as a student project by Linus Torvalds, a typical starting point for many open source applications. Over the last two decades, Open Source Software (OSS) has evolved from being a hobby to representing a fully fledged IT solution, a viable alternative to proprietary software. It is now backed by some of the most successful IT companies, such as IBM which is investing $1 billion dollars in OSS projects, and Google by sponsoring many projects through its Summer of Code program.

The low cost of open source software and the support given by these companies has encouraged many countries worldwide, both developed and developing, to consider implementing OSS in their public sector's IT infrastructure. Examples include Germany, Spain, Singapore, India, Brazil, Peru (8), China (10) and the US Department of Defence (3). Some countries are even implementing laws to encourage OSS adoption. An IEEE article reports that "Over the past year (then 2003), more than two dozen governments have passed or proposed nearly 70 laws or policy changes encouraging the use of open source software" (1).

Source code availability and low cost are some of the simplest differences between the two solutions amongst other distinctions. In order to evaluate them, the government should look beyond technical superiority arguments and analyse more the micro-economical issues, such as cost of implementation and effect on the economy, educational issues such as the effect on the education sector, and the political issues surrounding the adoption of a solution.

Economy

Due to its nature, open source software is freely available to anyone. License costs are dramatically lower than proprietary solutions. Analysts refer more to the Total Cost of Ownership or TCO (7). TCO assesses various factors to evaluate the total cost of a particular solution. These factors include software licenses, labour, support and hardware costs. There are many observers asserting that OSS TCO can be significantly lower than proprietary solutions. This is further enhanced in developing countries because cost of labour, often the most significant aspect of TCO, is significantly lower than in developed countries.

It was no surprise when the United Nations Conference on Trade and Development indicated that Linux has been a significant force behind some developing countries' increased IT ascendancy in recent years. The openness of Open Source Software encourages local companies and start-ups to provide custom services and software that is more suitable for their clients. This in turns decreases the unemployment figures especially amongst the educated university graduates, one of Algeria's main employment problems.

Conversely, choosing a proprietary solution leads to off shoring more hard-earned money in foreign currencies to foreign companies. The companies will be of no direct and efficient benefit to the local company, thus the investment potential of this capital will vanish. In contrast, choosing an OSS solution will help direct that money to local companies, creating an IT support segment around the government, injecting capital into local start-ups, and investing in human capital as more employees are trained with new skills to support the solution. This model worked well in China which invested in a local Linux distribution called Red flag (14), and in Spain where support was given for another local Distribution called LinEx (5).

Education

Educationally, OSS projects could move the education sector forward, especially in areas related to computing and software engineering, by providing lively materials of study. This has been observed by MIT's media lab as they announced that their One Laptop Per Child (OLPC) programme will make of use OSS and the Linux operating system. The availability of source code for these OSS projects and the openness of standards that they employ will help encourage students to gain a familiarity with the solution and develop the needed skills before entering the job market. OSS also often directly implements findings of the research community, helping research institutions put their ideas into test.

Many of the benefits of OSS projects come from the powerful customisability that they allow to meet internationalisation issues such as local languages. For example, Arabeyes (2) is an independent organisation that has been working tremendously to port the most popular OSS projects into Arabic and provide standards for Arabic software. The independent nature of the organisation and the clear standards of OSS projects have helped in increasing the efficiency of the relatively small team while working with multiple projects at a time.

National Security

On the political front, as any government has a moral obligation to spend money wisely and seek the solutions that are in the best interests of the nation, the issues are even more critical.

A democratic government will naturally deploy solutions that do not lock out some of the population. Using open standards makes sense because they can be implemented by a wider range of platforms and applications. As more and more governments worldwide are in favour of OSS and open standards, other governments will need to use the same standards for better data interoperability and proper communications. A Mitre (3) report commissioned by the US military puts it best by reporting "Open source will benefit the government by improving interoperability, long-term access to data, and the ability to incorporate new technology". After all, many OSS standards have been developed by governmental agencies such as the US National Security Administration introducing of SELinux. Open standards like HTTP and DNS continue to provide much of the

backbone for rapid advances in IT and communications because of their open nature.

Open source licenses like the GPL and the MPL enable the client to fork and customise the project by independently building on a particular software package and giving it a new direction. This way a government can take control of the solution, freeing them from any potential vendor lock-in with a software company or a country. This is of great strategic benefit to the government in order to stabilise the IT sector away from potential economic and political events such as the bankruptcy of a company or political and economic sanctions. Being free to distribute legally, OSS could even solve the daunting problem of enforcing copyright laws and fighting illegally copied software, as these are some of the requirements imposed by Algeria's application to join the World Trade Organisation (WTO).

In essence, OSS solutions are ideal for Algeria as a developing country looking to provide the necessary IT infrastructure and move the economy and IT sector forward.

In a market where the best software does not necessarily rise to the top because of marketing and other non-technical factors, the government has to step in with policies that encourage the adoption of OSS to provide the same level of playing field for the two solutions.

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OSS, One Success Story

Preview by: **Sofiane NACI**

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Open source software (OSS) has become in recent years one of the most talked about phenomena in the information technology world. Although the paradigm has been around for many years as a volunteer driven success story, it has been discovered by big businesses and governments only recently, and has become a very attractive alternative for policy makers. Today, 50 to 75% of Internet activity uses open source software; eight of the world's 10 fastest supercomputers are powered by Linux; and open source software is embedded in many portable devices.

This phenomenal growth of OSS presents developing countries with an opportunity to escape from technological dependence on developed countries, but also a challenge to build up local expertise. In his article (1), S. Djerfi analyses the potential benefits of adopting OSS in the developing world and outlines the possible ways in which the challenge can be taken.

Perhaps one of the main problems faced by users of commercial software is the cost associated with licensing, training and hiring skilled people. Using OSS not only cuts these costs down but also brings many more benefits. It creates a strong base for transfer of knowledge by employing local people and thus contributing to the local economy. Most importantly, OSS allows better security auditing.

Open source software can push governments of developing nations ahead in the world, but only if they participate as producers of the technology themselves. According to the United Nations University (UNU), developing regions such as China, East Asia, India, and South America represent the biggest market for open source software. However, UNU officials worry that there may be too few open source developers in those regions. They estimate that only 2% of OSS developers come from developing countries.

To prolong this success story, governments must play a vital role in promoting and encouraging the use and development of OSS. The author uses Brazil as an example. The country has proved to be a fertile ground for open-source laws. Richard Stallman, founder and president of the Free Software Foundation, confirms "This is a political and ethical issue, just like freedom of the press or freedom of association. It makes sense, especially for countries that are not rich, to encourage the country to switch from proprietary software to free software".

To sum up, the article concludes that open-source software is not only a useful tool for the devel-

1. S. Djerfi. Open Source Software: Benefits for the a Developing Nation. IBScientific 2(4):108-111, 2006.

oping world, but clearly has the potential to help find solutions to the most pressing problems faced by the populations of developing countries.

Interatrial shunts and migraine headaches: is the link a fact or fiction?

Preview by: **Rabia BOURKIZA**

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Patent foramen ovale (PFO) and atrial septal defects (ASD) are the two main defects in the wall that divides the two atria of the heart. The abnormal connection between the right and the left atrium results in right to left shunting when the right atrial pressure exceeds the left. This creates a potential for deoxygenated blood, blood clots and other substances in the blood (e.g. Atrial Natriuretic Peptide) to enter the arterial circulation, eventually leading to important clinical conditions such as arterial hypoxaemia, ischaemic strokes, decompression illness and migraine (1, 6).

A number of studies have suggested that patients with right to left shunt suffer from migraine headaches more than the general population. However, little is known about the mechanisms that trigger migraine in this condition. One theory suggests that substances that are normally metabolised by the lungs could cause migraine when shunted directly into the cerebral circulation via the interatrial defect, but no pathophysiological link has been established yet (2).

> Percutaneous transcatheter closure of right to left shunts may reduce the frequency and severity of migraine headaches

Percutaneous closure of interatrial defects has been associated with high success rates and minimal complications. And to challenge our knowledge about the relationship of migraine and interatrial shunts, studies demonstrated that closure of the interatrial defect results in pronounced improvement of migraine headaches (4, 5).

In this issue of IBScientific, Belkhiri investigates the prevalence of migraine in a questionnaire-based retrospective study of 235 patients with right to left shunt (3).

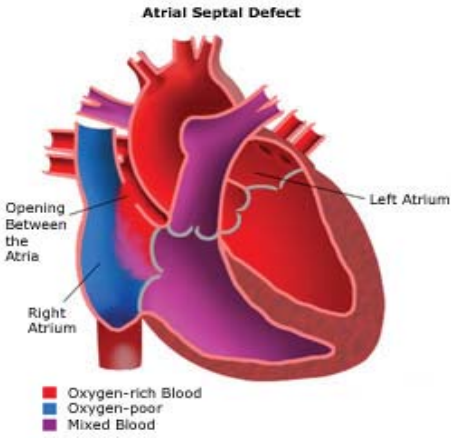

Figure: Defects in interatrial wall lead to right to left shunt, hence deoxygenated blood reaching systemic circulation.

The study confirms the higher prevalence of migraine in these patients, and interestingly highlights how this debilitating clinical condition is improved by percutaneous closure of the interatrial defects. The findings are consistent with previous studies suggesting a causative relationship. However, to date there is no randomised or properly controlled prospective trial to prove it. If randomised trials prove percutaneous shunt clo-

sure to be safe and efficacious the question will be whether to address the migraine headaches when they are symptomatic or more importantly to perform the procedure as early as possible in order to prevent the primary chemical triggers of migraine from reaching the brain in the first place. Questions will also arise about the nature of the relationship of migraines and right to left shunt: is it causative? Or is there an inevitable genetic link? Until then smaller studies continue to search for the evidence and the paper presented by Belkhiri on page 108 of this issue serves as a good example.

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OPEN SOURCE SOFTWARE

Benefits for a Developing Nation

Sid DJERFI

In a previous article (Issue 02), we introduced the Open Source Software paradigm. In the present article, we shall explore how the Open Source Software (OSS), as movement and software production methodology, can benefit developing countries like Algeria by analysing similar initiatives in other parts of the world. This article does not aim to undermine the value of commercial closed-source software, but aspires primarily to highlight OSS as a suitable alternative with many particular benefits to developing countries.

Without doubt OSS, which started as movement driven my the motto of the free distributions and sharing of knowledge, has given the world a respectable selection of freely distributed, open-source software applications, an innovative methodology for developing software and a new approach to harnessing the resources of distributed virtual communities. The outcomes of the OSS revolution have been leveraged with varied levels of success. The success of OSS in the corporate, governmental and non-profit sectors in the developed world has many lessons to offer to developing countries like Algeria. In the present article, we shall explore a selection of the benefits of Open Source Software, how it can be promoted, and the barriers that need to be overcome for its adoption by groups and individuals.

The Benefits

1. Free software

At the most basic level, governmental institutions and citizens can directly use the software developed by the OSS community for the provision and access to the different public services. The OSS community has produced many successful software packages of industrial standard. The wide deployment of the LAMP package (Linux, Apache, MySQL and PHP) for the management and operation of web sites and web applications illustrates the maturity that OSS projects

Received: 30 September 2006; **Revised:** 5 October; **Accepted:** 7 October 2006; **Published:** 30 October 2006.

The author declares no conflict of interest.

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have achieved. Many of these packages are already successfully deployed in developing countries like Algeria. Brazil, for instance, has made great leaps in the use of the Linux operating system within its government structures. The City of Munich is another living example of the success of Linux within the public sector.

For a pure consumer of OSS, the first attraction to the OSS packages is the low or null cost associated with the software. Many studies have demonstrated the lower Total Cost of Ownership (TCO) of OSS (e.g. [1]). At the same time, other studies have shown a contradictory view (e.g. [2]). We will not be discussing this issue in detail here, however it is suggested that a study of TCO should be conducted before any OSS implementation, keeping in mind all non-financial benefits. The TCO is a combination of the cost of software licensing, initial setup, training, maintenance and continuing user support. Generally, the licensing fee for acquiring OSS is zero, thus giving it a massive advantage over commercial software. One of the reasons behind the slow adoption of OSS in developing countries is the prevalence of pirated software available at negligible prices in comparison to their legal retail price, beyond the purchasing power of most users. As the fight against piracy intensifies, costs of software will increase substantially in such countries because purchasers would have to pay the full price as supposed to the reduced cost of pirated copies. While this might not affect retail consumers in the first instance due to the difficulty of copyright law enforcement, the effect on businesses and government would be felt earlier. In 2005, the Algerian government launched an initiative, OusraTIC (www.oustaric.dz), which aimed to provide a wider access to PCs and Internet through credit. One of the criticisms of the initiative is its failure to address the issue of the principal cost of the PCs, including the cost of software, which could have been reduced through the provision of an OSS alternative (Linux). In countries where the cost of legal software is prohibitive, a free alternative should be available and favoured.

It is in the back-end (servers) where OSS made its mark. As mentioned before, the LAMP package has been extensively deployed as the back-end of many web-based software systems. Amazon and Google are two examples that illustrate such a success. The Linux operating system has on its own accomplished a reputable position as a server operating system due to its reliability and security.

On the front-end, or desktop, where computers are used by the masses, the reach of OSS has been less significant. In the early days of OSS, most applications were developed by competent IT people to serve the needs of other fellows, and less emphasis was put on the accessibility and usability of such applications. This did not pose a major issue to the adoption of OSS at the back-end because systems are maintained by skilled professional IT administrators. On the desktop however, OSS had difficulties challenging the market share of commercial software to which the majority of users have been accustomed. While getting people to switch on the desktop is still a challenge for OSS, many successes should be noted. Many easy-to-use Linux distributions have been developed (e.g. Ubuntu, Linspire), office applications that offer similar features of Microsoft Office (e.g. OpenOffice.org), and more recently the success of the Firefox web browser. Many institutions willing to adopt OSS on the desktop are discouraged by the likely prohibitive costs of training their workforce to a productive level on the new platform. A cost-benefit analysis should be performed to compare OSS with its commercial counterpart before any decision is made.

2. Transfer of Technology

A common aim amongst developing countries is the acquisition of technology from the developed world. By definition OSS is free, open and globally available thus giving anyone in the world access to software technology. The software produced, documentation and community support is available to anyone with Internet access. Institutions in countries like Algeria are able to acquire the source code and study it to develop understanding of the underlying technology. The rules of OSS allow the modification and redistribution of the software giving developing countries the ability to adapt the software to their needs. Thanks to OSS, the software and underlying technology become more accessible and reusable. Commercial, governmental and educational institutions in developing countries now have access to millions of lines of code that they can utilise to further technology endeavours in their geographies.

Educational institutions, universities in particular, can be a major benefactor of the OSS revolution. Thanks to OSS, they can expose their students to full-scale operational software packages. The philosophy, methodology and software brought to life by the OSS movement give universities in developing countries an incomparable learning resource that challenges and expands students beyond the dated textbook examples. Academia is accustomed to the ethos of knowledge sharing, which OSS is built on. This would make OSS a natural choice for teaching software technology. Universities in Algeria should explore the many possible benefits they can reap from OSS.

3. Business creation

In the introductory article, we discussed how Open Source does not contradict with commercial gain. Unlike closed-source software where licensing fees are the primary source of revenue, OSS allows lucrative gain through added value. Value is added to software through the services offered around it, namely configuration, consulting, training and support. Following the inception of OSS, many companies sprung up to provide services to adopters of the new paradigm. Such a model can be replicated in developing countries where unemployment is problematic. Few Algerian IT firms have already started offering OSS products. This has tended to be in the Content Management Systems arena where OSS has many strong offerings.

4. Security

A regular concern of many governments over the use of closed-source software is their inability to audit the code and attain assurance that it does not compromise their national security. Open Source is by nature transparent and auditable by anyone. This nature gives OSS an advantage over commercial software, especially for institutions that require full confidence in the software such as the armed forces. Many, however, argue that OSS could contain malicious code that goes unnoticed due to the free circulation of the software. It is also argued that corporations behind commercial software commend more trust than grassroots developer communities. It has to be noted that many OSS projects have very strong communities that operate strict processes and are highly regarded in the industry. Many OSS projects have also corporations behind them (eg. Red Hat, MySQL, JBoss).

While the question over whether OSS is more secure than its closed counterpart remains in debate, it is clear that security-critical institutions would benefit hugely from access to the source code of the programmes they use and OSS provides that by defini-

tion.

In addition, OSS gives institutions, especially governments, independence from commercial software houses and frees them from lock-in practices.

Promoting OSS

As we appreciate the benefits developing countries can reap from the OSS movement, we understand the alternative offered that should be considered in the advancement of Information Technology in such countries. Let's explore how OSS can be promoted.

1. Policy

In Brazil, government institutions are required by law to use OSS. Brazil's technology officer, Sergio Amadeu, the president director of the national institute of information technology, announced in 2003 that paying for software licensing fees was not economically sustainable. Many other countries have taken a similar stance, namely Malaysia, Argentina, South Korea, The Canary Islands and Venezuela. The Chinese government demonstrated its dedication to OSS by developing its own national distribution of Linux (Red Flag Linux). Other states have either declared their recognition of OSS as a viable open and encourage its use (e.g. Sweden), or are still debating their OSS policies and legislations (e.g. Australia). Public policy has the power to encourage the use of OSS in developing countries and efforts should be made to ensure policy makers understand OSS and its benefits.

2. Grassroots

The phenomenal success of the Firefox web browser proves, amongst other things, the power of the grassroots movement behind OSS. The Firefox community run an aggressive promotional campaign that included video ads, banners, emails, car stickers, mouse mats, T-Shirts and baseball caps. Many Linux groups organise install parties, where would-be-adopters meet enthusiasts, discuss their concerns, experience the operating system and get it installed on their systems. The efforts of the grassroots movement can be replicated in developing countries, and have been on many occasions (Ethiopia). Algeria's disparate advocates of OSS can consolidate efforts to promote the software and its ideology.

3. Educational institutions

Educational institutions, universities in particular, have the duty of exposing their students to leading ideas. The OSS movement, through its innovative model for developing, distributing and supporting software, is too important to be ignored. Higher education institutions should teach the OSS methodology as part of software engineering courses. In addition to the academic benefits, this would lead the students to appreciate the benefits of OSS and its importance in the development of the country.

Barriers to success

Without doubt, any new initiative would have to overcome many obstacles on its way to success. In a developing country, the hurdles are even higher. Many developing countries are still building their information infrastructure and can find it difficult to make technology choices. Latecomers, however, do have the advantage of being able to get the latest technology at less cost than others who have the added difficulty of moving from old systems. The main obstacles OSS has to overcome are:

1. Lack of skills

Developing countries lack the skilled workforce in IT, and particularly in OSS. For example, Algeria only counts around 260 Linux users (LinuxCounter.org). While the level of skill for operating a Linux system has reduced significantly over the lifetime of the operating system, the skill required to administer a Linux server remains a specialised one, which is the case for most server systems.

On the front-end, the majority of the Algerian population remains IT illiterate, and the minority who is comfortable using a PC is only used to Windows-based systems. Switching to Linux systems amongst the masses is yet to take-off at a global level, and Algeria would be no exception to this. Any early adoption is expected to be amongst the highly skilled, in IT, especially those in higher education.

2. Culture

To explain the impact of culture on the utilisation of free alternatives to commercial products, we draw an anecdotal analogy with satellite TV services. Few years ago, the French satellite TV operator, Canal+, decided to tackle the Algerian market in hope to sell legal access to its TV service and counter the prevalent piracy. Canal + retreated with the conclusion that "it is in Algerian culture not to pay for what can be acquired for free" (Le Point). While the claim is exaggerated, it cannot be ignored that a similar view applies to software. In Algeria, software is still cheaply available; software shops sell the applications for practically the price of the CD and its production. There is no economic incentive for individual users to alter their behaviour, at least not in the current state of intellectual property enforcement. As mentioned earlier, business and government agencies have a much more significant incentive to switch to OSS as enforcement of commercial software licensing is more feasible.

3. Commercial pressure

In 2002, the Peruvian government decided to adopt OSS principles through a bill specifying rules of government use of software, which did not literally specify OSS in particular but required all software procured by government to meet a set of freedom standards that match those of the Open Source Definition. Following the proposal of the bill, Microsoft did not hesitate to respond in an attempt to dissuade the government from the adoption of the bill. Microsoft's efforts were countered openly in a historic letter from Congressman Nuñez. As commercial software houses started to realise the threat of OSS to their market share, they reacted, understandably, to protect their revenues. Closed source software firm have made many attempts to disqualify OSS. The quality, security, support and TCO of OSS have been questioned on many occasions. To gain ground in developing countries, the OSS movement has to compete with the lobbying powers of commercial software. For instance, Microsoft recent involvement in the OusraTIC project helped strengthen its relationships with the government and gives it lobbying power. This is not unethical on behalf of Microsoft and its involvement should be encouraged. The OSS movement does not have the lobbying power of commercial organisations. In Algeria, a unified advocate group is yet to be formed.

4. Lack of localised applications

If we consider software to be an essential tool for the economical activity of the country and a valuable medium for personal development and learning, the provision of such

means need to be adequate to the intended population of users. The language in which the interface and documentation of the software are written can greatly influence its level of adoption. This is particularly true for OSS, where albeit the large number of applications developed by the OSS community, many are not localised to meet the needs of a particular country or group, despite the availability of the tools to do so. To take the example of Algeria, Arabic and French need to be supported for applications to be widely accepted by individuals and institutions. Translations in Latin languages are widely available, and thanks to projects like ArabEyes (arabeyes.org), many applications have been translated to Arabic, although the progress is manifestly slow. In effect, since OSS is driven by skilled developers and devoted users who share the same vision in freely sharing and contributing to software development, this slowness can be linked to the lack of such cohesive communities who can demonstrate such qualities.

Certainly, the cost of adapting a commercial application to a particular language (or dialect) to suit a localised population cannot always be justified economically, however, since OSS if not driven by financial incentives, it can be considered to be the best option to encourage the development of localised software. Indeed, the OSS movement can support languages of populations that would be deemed commercially unprofitable. For example, support for Berber fonts, Tifinagh, has been developed and the language is already supported by some Linux distributions (Ubuntu, Mandrake), and with local effort, software interfaces can also be translated to Berber. At a larger scale, nations can gather the required resources to modify OSS to suit their local needs, something that is not possible with closed-source software. Governments, educational institutions and software vendors can localise OSS and distribute it. Many initiative of this kind exist, such as the Chinese government and its work on Red Flag Linux. In India, a country with 22 official languages, various parties are taking part in the Indian Linux Project to bring the benefits of the information technology to the masses by localising OSS.

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- OpenOffice.org: http://www.openoffice.org
- Red Flag Linux: http://www.redflag-linux.com
- The Indian Linux Localisation Project: http://www.indlinux.org

What next?

The OSS concept should be brought to people's attention. Initially, it should target professionals in the field who are more likely to experiment with new technology. Media, trade associations, and universities are very well placed to produce the level of publicity needed. In a sense, the present article and its predecessor aim to create some awareness of OSS through the readership of this publication.

The user community in Algeria should congregate to share knowledge, resources and develop a plan to promote OSS. A formed community can advocate through the media, industry events and OSS-specific events (eg, install parties). Success stories need to be shared to encourage would-be adopters to take further steps towards OSS. Many OSS successful adoptions have taken place in Algeria, particularly in the arena Content Management Systems (used to manage large websites). Many Algerian sites make use of OSS Bulletin Board applications for discussion forums. Unfortunately, these successes are not very visible. On occasion, the adopters removed the developers' credit, a cardinal sin in the OSS movement; these users understood the economic value but ignored, intentionally or unintentionally, the philosophy of OSS.

A Final Word

Given its various benefits, and their particular relevance to a developing country like Algeria, OSS ought to be considered in all technology decisions. OSS has proven to be a viable option, and a particularly interesting one for developing countries.

Beyond software, the Open Source model (OS) can contribute and has contributed to the development of nations. The ThinkCycle open design project (MIT MediaLabs) used the OS model to design and develop medical devices for the developing world. Books published under OS licenses have been printed and distributed to children in India and Africa. This publication is published under an OS license allowing anyone to redistribute its content.

Open Source is much bigger than its tangible creations. Open Source is about community, about working together for the benefit of all. It is about empowering the developers and the users. Above all Open Source is all about openness; a necessary ingredient for moving people forward.

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FEATURE

Migraine

in Adults with Interatrial Shunts Before and After Shunt Closure

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Right to left shunts may be associated with increased risk of migraine and strokes in young people. We investigated the prevalence of migraine in patients with these shunts and the effect their closure has on this. 235 patients with an average age of 43.12 3.98 years (95%CI) had their shunts closed by transcutaneous catheterisation between March 2000 and June 2004 (69 with patent foramen ovale and 69 with atrial septal defects). The indications for closure were not related to migraine. After an average of 1.69 0.2 years (95% CI) from intervention, these patients were invited to complete two questionnaires relating to the presence, frequency, severity and presence of aura of migraine, or non-migrainous headaches. The first questionnaire concerned the period before the intervention, while the second the one after. 142 patients returned their forms, 4 were incomplete and were discounted. Comparison was made between the prevalence of migraine and other headaches, the presence or absence of aura and between men and women. There was a 24.64% absolute risk reduction in the risk of migraine in the 69 PFO patients (14 [20.28%] after closure versus 31 [44.92% before]). The risk reduction for ASDs was just 14.5% (17 [24.63% after] versus 27 [39.13% before]). In 5 (7.24%) PFO patients the migraines persisted but became less frequent, and the figure for ASD patients was just 1 (1.45%). In 10% of PFO patients the severity of attacks remained unchanged, but lessened in 8.69%. 25 (80.64%) of PFO migraineurs, compared to 20 (74%) of those with ASDs, suffered from migraines of aura. In addition, only 20.68% of the migraine sufferers in the study sample were men. Furthermore, there was a minimal effect of closure on the prevalence of non-migraine headache. Right to left shunts are associated with increased prevalence of migraine and their closure significantly decreases this risk.

Received: 3 September 2006; **Revised:** 18 September 2006; **Accepted:** 30 September 2006; **Published:** 30 October 2006.

The author declares no conflict of interest.

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Patent foramen ovale (PFO) and atrial septal defects (ASD) constitute a major cause for right to left shunting. PFO is the most commonly persistent abnormality of foetal origin, being present in around 25% of the general population (1,21,6).

There were suggestions that interatrial shunts may be associated With an increased prevalence of migraine and cryptogenic strokes in young adults4 and an early report by Wilmshurst et al (2001) also suggested a correlation between migraine and right-to-left shunts. There is some evidence from other studies to support this, but they are generally not randomised and retrospective. Percutaneous transcatheter shunt closure is a recent technique and our study cohort is one of the largest in the UK. The study adds weight to the existing evidence on the subject and the aim was to investigate the prevalence of migraine in patients with interatrial shunts and whether percutaneous transcatheter closure has any effects on migraine.

Methods

Percutaneous transcatheter closure of patent foramen ovale (PFO) and atrial septal defects (ASDs) was undertaken in 235 patients between March 2000 and June 2004.

Indications for closure were as follows; in patients with ASDs: a large defect usually causing haemodynamic problems (e.g. breathlessness…etc.), a shunt of more than 2:1, an increased size of the right ventricle on echocardiography and pulmonary hypertension. In patients with PFOs: young age with a cryptogenic stroke or CT/MRI evidence of a cerebral incident. Patients were in no case selected on the basis of migraine or told of established links between these shunts and migraine.

After an average of 1.69 ±0.2 years from the intervention, the patients were invited to take part in the study and were sent two questionnaires to complete. These related to the period before and that after the procedure. The first questionnaire related to the period before the procedure and asked whether they suffered from migraines or headaches, and if so the frequency and the severity of the attacks. A severity score out of 10 was used, with 0 indicating pain-free status and 10 for the most severe pain. The questionnaire also addressed whether migraine was associated with aura, fortification spectra or other complaints (sensory, motor or visual). The second asked similar questions but was aimed at the post-shunt closure period.

Data was collected from the returned questionnaires and patients were divided into two groups: ASD and PFO. To elucidate if there is any effect of precutaneous transcatheter closure on the presence of migraine, its prevalence prior to intervention was compared to that in the post-intervention period. Comparison was also made between women and men, and between patients with and those without aura.

Table 1: Results in patients with PFOs (69 patients)

	Before Closure		After Closure	
	Headache	Migrane	Headache	Migrane
Patients positive for condition	34 (49.27%)	31 (44.92%)	28 (40.57%)	14 (20.28%)
Patients negative for condition	35 (50.72%)	38 (55.07%)	42 (60.86%)	55 (79.71%)

Table 2: Results in patients with ADSs (69 patients)

	Before Closure		After Closure	
	Headache	Migrane	Headache	Migrane
Patients positive for condition	33 (47.82%)	27 (39.13%)	29 (42.02%)	17 (24.63%)
Patients negative for condition	36 (52.17%)	42 (60.86%)	40 (57.97%)	52 (45.36%)

Results

142 questionnaires were filled and returned but only 138 were considered for analysis (4 were returned incomplete). The average time between carrying out the intervention and completing the questionnaires was 1.69 ±0.2 years (95% CI).

In all, there were 69 ASD patients (44 women and 25 men) and 69 PFO patients (40 women and 29 men). The average age at procedure time was 43.14 ±0.9 years for PFO patients and 52.13 ±3.98 years for ASD patients (95% CI).

The percutaneous transcatheter closure procedures were all successful except in two patients where surgical intervention was needed. There were a few in-laboratory complications. These included: ASD device dislodging into the right ventricle, PFO device sticking in the right femoral vein (necessitating vascular surgery), and a vasovagal event during sheath insertion. There was also an occasion where a patient went into a cardiac arrest (asystole) because of air in the right coronary artery.

Of the 69 patients with PFOs, 31 (44.92%) were suffering from migraines before the closure, whereas only 14 (20.28%) still had it afterwards. That is a reduction of 24.64% (see Table 1).

Of those with ASDs, there were 27 migraine sufferers beforehand (39.13%) and only 17 afterwards (24.63%), with a reduction of 14.5% in prevalence (see Table 2).

Of the 14 migraineurs with PFOs who still had migraines, 5 (7.24%) experienced less frequent attacks and in one (1.45%) the aura became less frequently associated with attacks. Eight patients (11.59%) experienced no change.

Of the migraineurs with ASDs who still suffered from migraines, 16 (23.18%) experienced no change and in one patient (1.45%), the attacks became less frequent.

Of the migraineurs with ASDs who still suffered from migraines, 16 (23.18%) experienced no change and in one patient (1.45%), the attacks became less frequent.

Pain intensity averaged 6.05 ±0.55 out of a scale of 10 (95% CI, 10 being the worst degree of pain) beforehand. After the closure it was unchanged in 7 patients (10%) migraineurs with PFOs and less painful in 6 (8.69%). It also became less severe in one of the 27 migraineurs with ASDs (1.45%).

Table 3: Results after closure for aura versus non-aura migraines

	Patients with PFOs		Patients with ASDs	
	Stopped	Active	Stopped	Active
Migraine with aura (45) (65.52%)	13	12	7	13
Migraine without aura (13) (18.84%)	4	2	3	4

Table 4: Closure outcomes for men versus women (migraineurs)

	Patients with PFOs		Patients with ASDs	
	Stopped	Active	Stopped	Active
Men (12) (17.39%)	8	1	3	0
Women (46) (66.67%)	9	13	7	17

Aura versus Non-aura migraine

The reported migraines were mostly of the aura-type. Of the total 58 migraineurs (31 PFOs and 27 ASDs), 45 of them had migraines with aura (77.58%) (see Table 3).

The PFO migaineurs were as follows: 25 (80.64%) had aura and 6 (19.35%) did not. Of the 25 with aura, 13 stopped having it (52%) compared with 4 out of 6 without aura (66.67%).

The ASD migraineurs included 20 patients (74%) who had aura and 7 (25.92%) who did not. In the aura-group, 7 (35%) still suffered from migraine after the intervention, compared with 3 (42.85%) of the non-aura group.

Men versus Women

Among the migraine sufferers there were 12 men (20.68%) and 46 women (79.31%). There were 9 men with PFOs; 8 (88.89%) stopped having migraines compared to 9 out of 22 women (40.9%).

There were also 3 men with ASDs all of whom recovered from migraine, compared with 7 out of 24 women (29.16%) (see Table 4).

Although men seem to have more favourable results, these are not very significant because of the small sample in the men's group.

Non-migrainous headache

There was a minimal effect of the shunt closure on the prevalence of non-migrainous headache in both the PFO and the ASD groups.

Among the PFO-patients, 34/69 (49.27%) were migraineurs before compared to 28 (40.57%) after the intervention. Among the ASD-patients, 33/69 (47.82%) were migraineurs before compared to 29 (42.02%) afterwards.

Discussion

Migraine is conceived as the product of genetic, environmental and behavioural factors, which interact to trigger the attacks (7,11,15).The pain of the headache is thought to be due to vascular dilatation and perivascular nociceptor activation caused by neuropeptieds and monoamines (2) with a possible involvement of the trigeminovascular system (18).

There is a 2-5 fold increase in migraine prevalence in patients with PFOs compared with the reported prevalence of 14% in those without PFOs (8,5)

Wilmshurst et al. (20) suggested that migraine could be initiated by trigger substances in large doses that overwhelm the pulmonary filter, where usually most triggers from the venous side of the circulation are spontaneously lysed and rendered clinically silent (13). In situations of right to left shunts, these trigger substances could act in lower doses because the shunt permits the pulmonary filter to be bypassed (19,12). This paradoxical micro-embolisation may ensue if right atrial pressure exceeds that of the left atrium; for example, after a Valsalva manoeuvre or while coughing (13). Also, migraine prevalence decreased after shunt closure in patients with decompression illness (20).

Our results also agree with other recent findings of reduction in migraine prevalence after PFO closure (9,14)

Wilmshurst reported that larger shunts were associated with a higher prevalence of migraine with aura, compared to smaller or no shunts. In our study, the difference was not significant; in patients with PFOs there was a prevalence of 44.92%, and in those with ASDs it was 39.13% (with ASDs viewed as larger shunts). Our findings fit with those of Lamy et al11, who did not find a correlation between the size of the shunt and the prevalence of migraine.

The natural history of migraine is that its prevalence tends to decrease with age but on average patients have migraines for over 14.5 years (14,4,10). The change in prevalence occurred less than two years from intervention and the findings are consistently significant that it is unlikely a reduction could be due to the natural history of the illness.

Prophylactic therapy after the intervention (for example with aspirin) could have a confounding effect on the results. However, the average time between the intervention and completing the questionnaires was 1.69 ±0.2 years (95% CI) and prophylactic therapy is usually stopped a few months after the procedure. In addition, the effect of aspirin on migraine prophylaxis was reported to be modest (1). These observations make it unlikely that a prophylactic therapy had any confounding effects on migraine.

The patients were told of the purpose of the study and this could have had a placebo effect. However, the findings are significantly higher than the documented placebo effect rate (16).

Because the study was retrospective, the questionnaires may have been influenced by recall bias, but this is unlikely to be very significant because of the debilitating nature of the illness in most cases.

Conclusion

There is a high prevalence of migraine in patients with right to left shunts. After an average of 1.7 years, percutaneous transcatheter shunt closure was associated with a significant reduction in migraine prevalence. Transcatheter shunt closure is a safe, minimally invasive procedure that avoids lifelong anticoagulation and has a very short in-hospital stay. However, these findings need to be validated by a prospective and randomised trial.

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